

What is claimed is:

1. A photosensitive composition comprising:

- (a) about 20-40% by weight of a epoxide-containing material;
- (b) about 5-40% by weight of acrylic material selected from aromatic acrylic material, cycloaliphatic acrylic material, or combinations thereof;
- (c) about 5-50% by weight of a reactive hydroxyl-containing material;
- (d) at least one cationic photoinitiator; and
- (e) at least one free-radical photoinitiator;

with the proviso that upon exposure to actinic radiation an article is produced having the following properties:

- (i) a tensile break before yield stress or a tensile yield stress greater than 13 N/mm²;
- (ii) a tensile modulus in the range of about 180 to about 850 N/mm²;
- (iii) a tensile break elongation before yield or a tensile yield elongation greater than 6%; and
- (iv) a notched Izod impact strength greater than 50 J/m.

2. The composition of Claim 1 wherein the article produced has a cloudy appearance that simulates polyethylene.

3. The composition of Claim 1 wherein the epoxide-containing material is selected from bis(4-hydroxycyclohexyl)methane diglycidyl ether; 2,2-bis(4-hydroxycyclohexyl)propane diglycidyl ether; 3,4-epoxycyclohexylmethyl-3,4 epoxycyclohexanecarboxylate; 3,4-

epoxy-6-methyl-cyclohexylmethyl-3,4-epoxy-6-methylcyclohexanecarboxylate; di-(3,4-epoxycyclohexylmethyl)hexanedioate; di-(3,4-epoxy-6-methyl-cyclohexylmethyl)hexanedioate; ethylenebis(3,4-epoxycyclohexanecarboxylate); ethanediol-di-(3,4-epoxycyclohexylmethyl) ether; 2-(3,4-epoxycyclohexyl-5,5-spiro-3,4-epoxy)cyclohexane-1,3-dioxane; and combinations thereof.

10 4. The composition of Claim 1 wherein the acrylic material is selected from 1,4-dihydroxymethylcyclohexane diacrylate; bisphenol A diacrylate; ethoxylated bisphenol A diacrylate; and combinations thereof.

15 5. The composition of Claim 1 wherein the reactive hydroxyl-containing material is selected from 1,4-cyclohexanedimethanol; polytetrahydrofuran polyether polyols; and combinations thereof.

20 6. The composition of Claim 1 wherein the free-radical photoinitiator is a 1-hydroxyphenyl ketone.

25 7. The composition of Claim 1 wherein the article produced has a tensile modulus in the range of from about 220 to about 650 N/mm².

 8. A photosensitive composition comprising:
 (a) at least about 20% by weight of a epoxide-containing material;
30 (b) about 5-40% by weight of an aromatic or cycloaliphatic acrylic material;
 (c) at least about 5% by weight of a reactive hydroxyl-containing material;
 (d) at least one cationic photoinitiator; and

(e) at least one free-radical photoinitiator;
wherein the composition comprises from about 250 to about
350 milliequivalents of epoxy per 100 grams of composition
and from about 140 to about 180 milliequivalents of hydroxyl
per 100 grams of composition, with the proviso that upon
exposure to actinic radiation an article is produced having
the following properties:

- (i) a tensile break before yield stress or a
tensile yield stress greater than 13 N/mm²;
- (ii) a tensile modulus in the range of about 180
to about 850 N/mm²;
- (iii) a tensile break elongation before yield or a
tensile yield elongation greater than 6%;
and
- (iv) a notched Izod impact strength greater than
50 J/m.

9. The composition of Claim 8 wherein the ratio of
milliequivalents of epoxy to milliequivalents of hydroxyl is
in the range of about 1.5 to 2.5.

10. A process for forming a three-dimensional article,
said process comprising the steps:

- (1) coating a thin layer of a composition onto a
surface;
- (2) exposing said thin layer imagewise to actinic
radiation to form an imaged cross-section,
wherein the radiation is of sufficient
intensity to cause substantial curing of the
thin layer in the exposed areas;
- (3) coating a thin layer of the composition onto
the previously exposed imaged cross-section;
- (4) exposing said thin layer from step (3)
imagewise to actinic radiation to form an

5

additional imaged cross-section, wherein the radiation is of sufficient intensity to cause substantial curing of the thin layer in the exposed areas and to cause adhesion to the previously exposed imaged cross-section;

- (5) repeating steps (3) and (4) a sufficient number of times in order to build up the three-dimensional article;

10

with the proviso the three-dimensional article has the following properties:

15

- (i) a tensile break before yield stress or a tensile yield stress greater than 13 N/mm²;
- (ii) a tensile modulus in the range of about 180 to about 850 N/mm²;
- (iii) a tensile break elongation before yield or a tensile yield elongation greater than 6%; and
- (iv) a notched Izod impact strength greater than 50 J/m.

20

11. The process of Claim 10 wherein the composition comprises:

25

- (a) about 20-40% by weight of an epoxide-containing material;
- (b) about 5-40% by weight of an aromatic or cycloaliphatic acrylic material;
- (c) about 5-50% by weight of a reactive hydroxyl-containing material;
- (d) at least one cationic photoinitiator; and
- (e) at least one free-radical photoinitiator.

30

12. The process of Claim 10 wherein the actinic radiation is in the range of about 280-650 nm.

13. The process of Claim 10 wherein the exposure energy is in the range of about 10-75 mJ/cm.

14. The process of Claim 10 wherein the tensile modulus of the article produced is increased by increasing the exposure energy.

15. The process of Claim 14 wherein the article produced has a tensile modulus in the range of from about 275 to about 620 N/mm².

15